Polmaddie1 User Manual

Issue – 1.0

Foreword

PLEASE READ THIS ENTIRE MANUAL BEFORE PLUGGING IN OR POWERING UP YOUR POLMADDIE1 BOARD.
PLEASE TAKE SPECIAL NOTE OF THE WARNINGS WITHIN THIS MANUAL.

Trademarks

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Polmaddie1 is a trademark of Enterpoint Ltd.

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Introduction

Welcome to your Polmaddie1 board. Polmaddie is Enterpoint's low cost product range that offers an economical way to begin programming with CPLDs and FPGAs.

The aim of this manual is to assist in using the main features of Polmaddie1.

The Polmaddie board comes in several variants based on different devices. Polmaddie1 is based on a Xilinx™ Coolrunner™-II CPLD XC2C128-7TQG144C. Should you require a board based on the XC2C256-7TQG144C please contact Enterpoint sales for a quote.

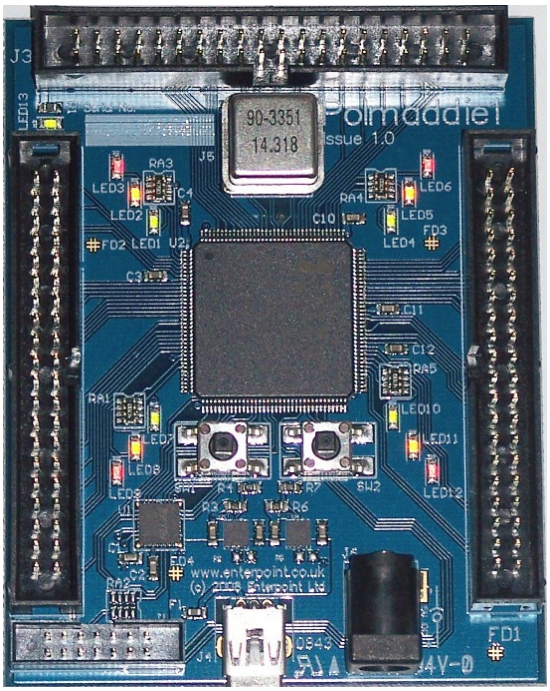

Figure 1 – Polmaddie1 Board

Finding Your Way Around

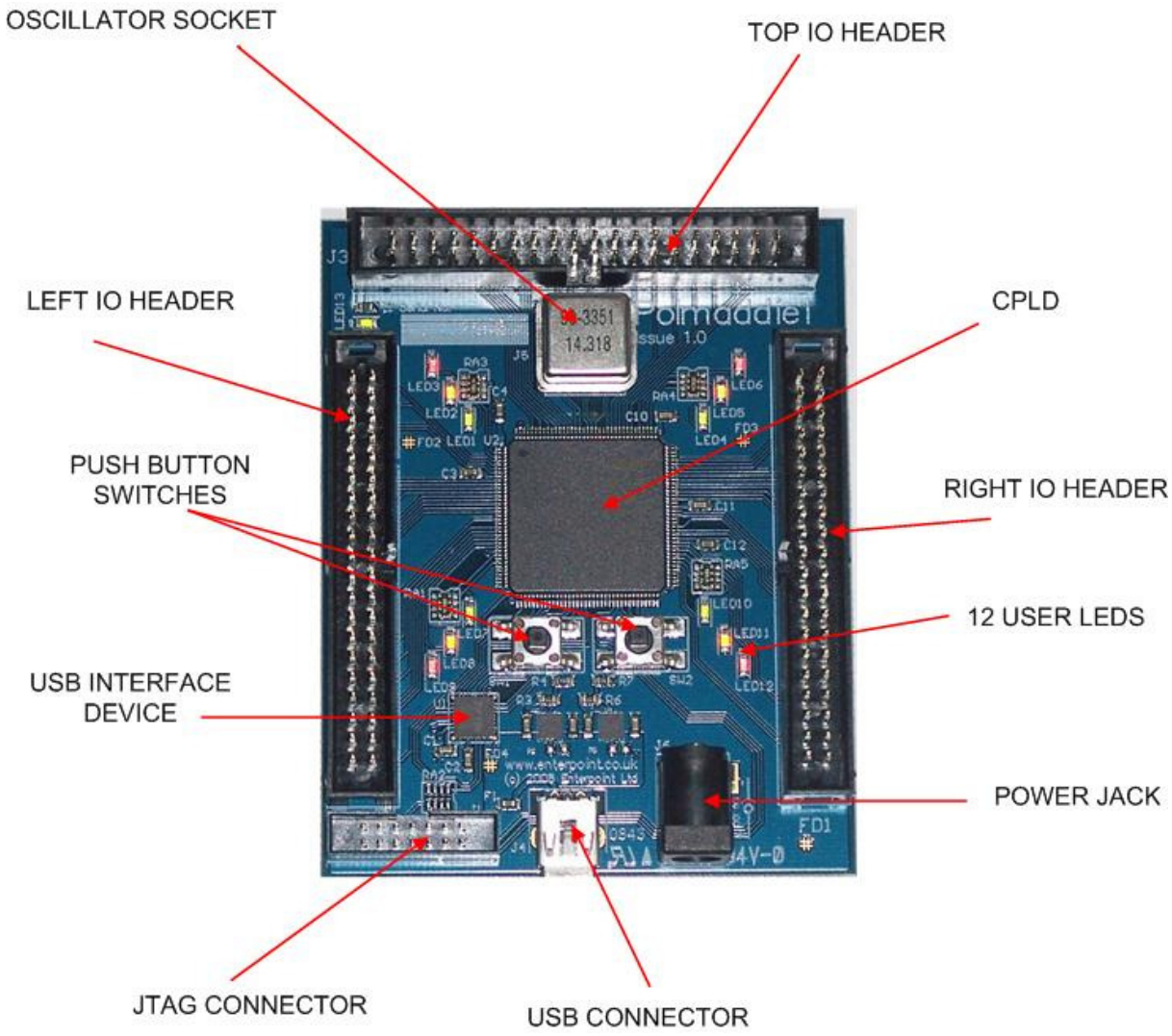

Figure 2 – Polmaddie1 Features

Getting Started

Your Polmaddie1 will be supplied pre-programmed with a 'traffic lights' test design. The test design will allow the user to determine that the LEDs and the push button switches of the Polmaddie1 board are working. To use this test you must do the following:

(1) Apply power to the Polmaddie1 board, either by connecting a 5V power supply to the 2.1mm jack socket or by plugging a cable into the USB socket, either from a USB power supply adapter or a PC. The current consumed by the Polmaddie1 running the test program is approximately 60mA.

(2) The LEDs should light in a 'traffic lights' sequence. There is also Power indicator LED which will light to show that power is present and the 3.3V regulator is working.

(3) Press SW1 (This is the left Push Button switch). The traffic lights sequence will reset to the beginning.

(4) Press SW2 (This is the right Push Button switch). The traffic lights sequence will pause until the switch is released.

Polmaddie1 Features

Power Input

Polmaddie1 is powered either by connecting a 5V power supply to the 2.1mm jack socket or by plugging a cable into the USB socket, either from a USB power supply adapter or a PC.

The 5V supply is used to power the USB interface and to supply two regulators, one producing 1.8V for the CPLD and the other producing 3.3V to power the CPLD, the LEDs and the oscillator. 3.3V is also available on pin 2 of each of the IO headers. If you decide to use this as a source of power for external circuitry please remember that the maximum total power available from the 3.3V Regulator is 1 Amp.

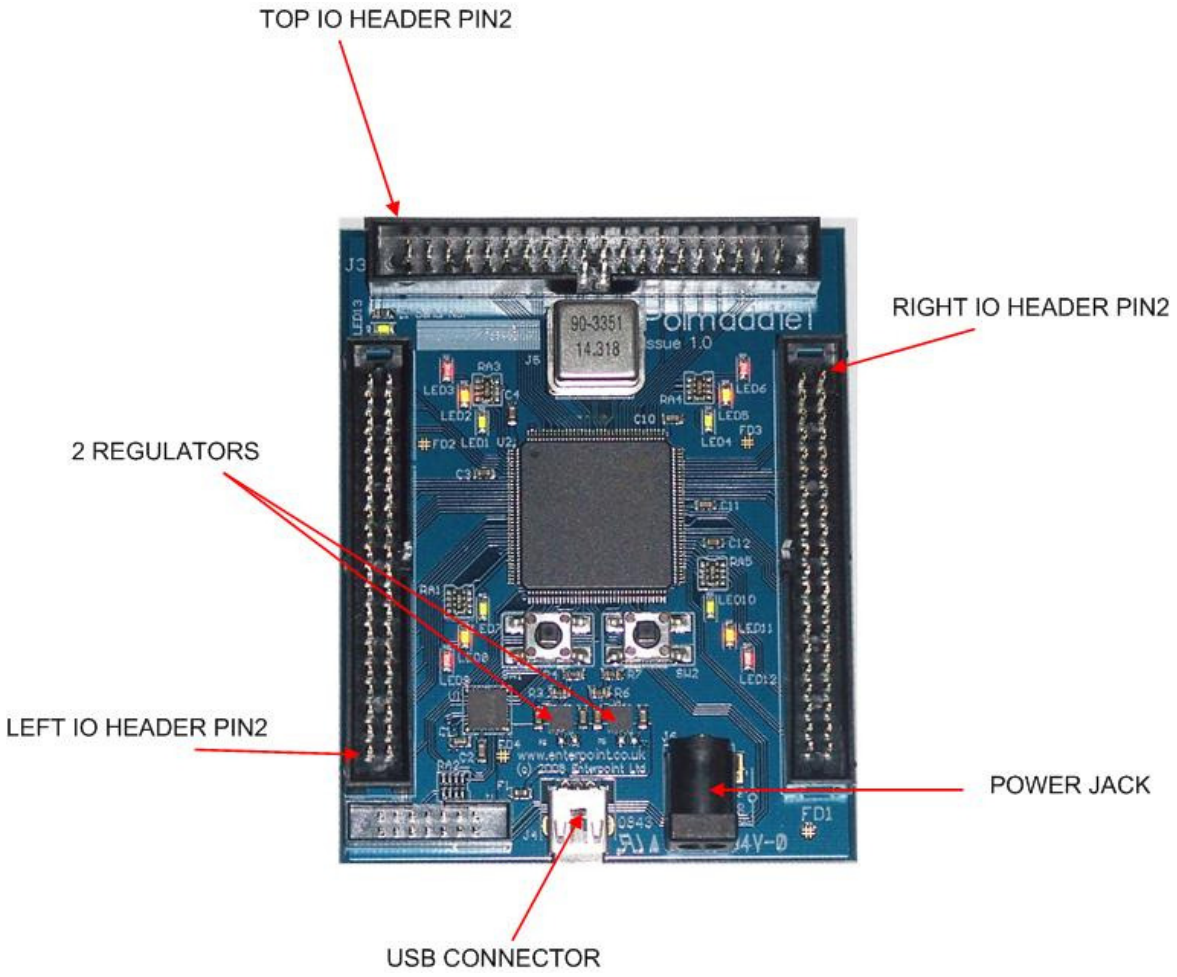

Figure 3 – Polmaddie1 Power Supply Features.

WARNING – THE REGULATORS MAY BECOME HOT IN NORMAL OPERATION ALONG WITH THE BOARDS THERMAL RELIEF. PLEASE DO NOT TOUCH OR PLACE HIGHLY FLAMABLE MATERIALS NEAR THESE DEVICES WHILST THE POLMADDIE1 BOARD IS IN OPERATION.

IO Headers

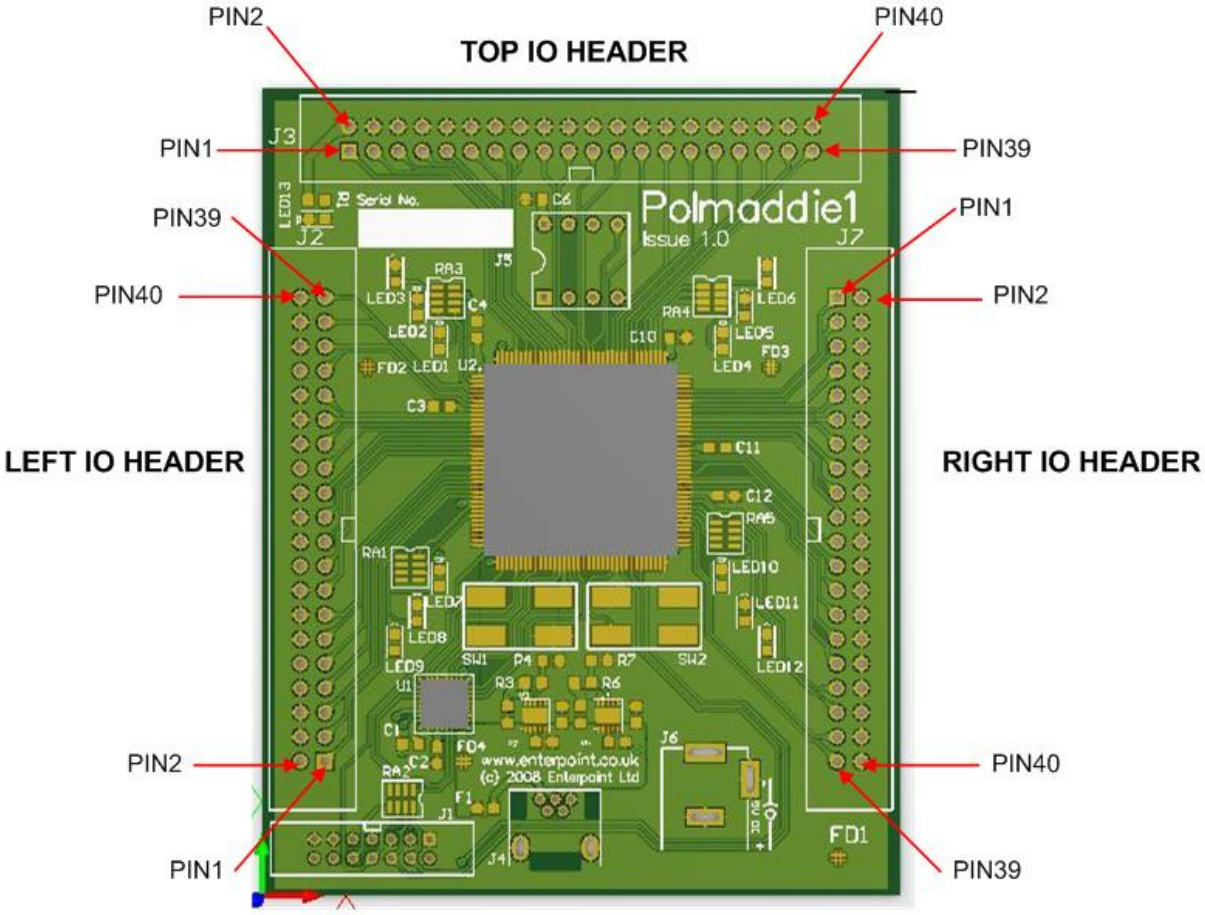

Figure 4 – Polmaddie1 Headers

The three 40-pin IDC Headers provide a simple mechanical and electrical interface for external signal inputs. The connectors on this header are on a 0.1inch (2.54mm), pitch and allow other electronic circuitry or user-designed add-on boards to be connected.

The headers each have 20 IOs routed to the CPLD. These are NOT 5V tolerant, the maximum input voltage should be limited to 3.3V. They each also have a permanent positive power pin on pin 2 and 19 permanent 0V connections as shown below:

LEFT HEADER					TOP HEADER					RIGHT HEADER				
PIN	USE	CPLD PIN	PIN	USE	PIN	USE	CPLD PIN	PIN	USE	PIN	USE	CPLD PIN	PIN	USE
1	IO40	26	2	3.3V	1	IO20	140	2	3.3V	1	IO60	105	2	3.3V
3	IO39	25	4	0V	3	IO19	138	4	0V	3	IO59	104	4	0V
5	IO38	24	6	0V	5	IO18	136	6	0V	5	IO58	103	6	0V
7	IO37	23	8	0V	7	IO17	134	8	0V	7	IO57	102	8	0V
9	IO36	22	10	0V	9	IO16	133	10	0V	9	IO56	101	10	0V
11	IO35	21	12	0V	11	IO15	132	12	0V	11	IO55	100	12	0V
13	IO34	19	14	0V	13	IO14	131	14	0V	13	IO54	98	14	0V
15	IO33	17	16	0V	15	IO13	130	16	0V	15	IO53	97	16	0V
17	IO32	16	18	0V	17	IO12	129	18	0V	17	IO52	96	18	0V
19	IO31	15	20	0V	19	IO11	128	20	0V	19	IO51	95	20	0V
21	IO30	14	22	0V	21	IO10	126	22	0V	21	IO50	92	22	0V
23	IO29	13	24	0V	23	IO9	125	24	0V	23	IO49	91	24	0V
25	IO28	12	26	0V	25	IO8	121	26	0V	25	IO48	88	26	0V
27	IO27	11	28	0V	27	IO7	120	28	0V	27	IO47	87	28	0V
29	IO26	10	30	0V	29	IO6	119	30	0V	29	IO46	86	30	0V
31	IO25	9	32	0V	31	IO5	118	32	0V	31	IO45	85	32	0V
33	IO24	7	34	0V	33	IO4	117	34	0V	33	IO44	83	34	0V
35	IO23	6	36	0V	35	IO3	116	36	0V	35	IO43	82	36	0V
37	IO22	5	38	0V	37	IO2	115	38	0V	37	IO42	78	38	0V
39	IO21	4	40	0V	39	IO1	113	40	0V	39	IO41	77	40	0V

CPLD

The main device on the Polmaddie1 is the XilinxTM CoolrunnerTM-II CPLD XC2C128-7TQG144C which has 128 macrocells.

OSCILLATOR

The single oscillator socket on Polmaddie1 supports a 3.3V, 8-pin DIL outline oscillator. This clock signal is routed directly through to the CPLD on **Pin 125**, which is a global clock input.

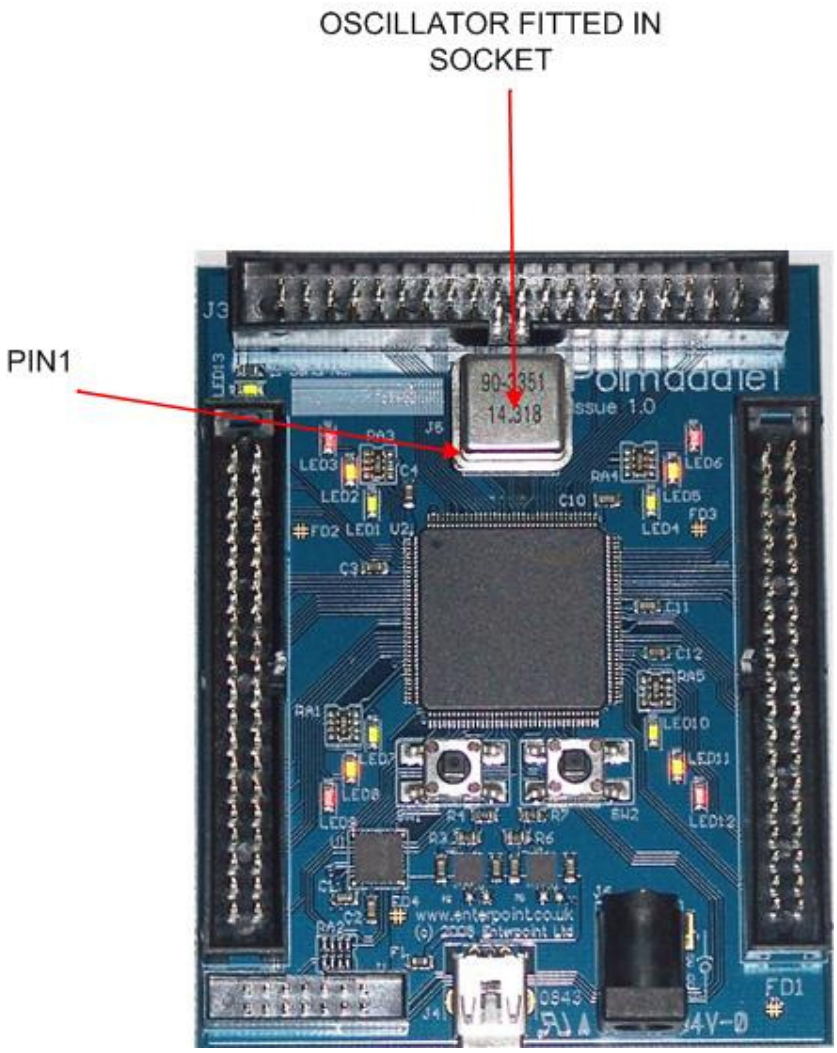

Figure 5 – Polmaddie1 Oscillator

LEDs

Polmaddie1 has 13 LEDs.

LED 13 is a green power indicator LED and indicates the presence of the 3.3V supply. It cannot be controlled by the CPLD.

LEDs 1 to 12 are arranged in 4 blocks of three, each block having one red, one orange and one green LED. This means they can be used to simulate traffic lights. They are all controlled by the CPLD. They connect to the CPLD as shown below:

LED	CPLD PIN	COLOUR	LED	CPLD PIN	COLOUR
LED1	3	GREEN	LED7	40	GREEN
LED2	2	ORANGE	LED8	30	ORANGE
LED3	143	RED	LED9	28	RED
LED4	110	GREEN	LED10	79	GREEN
LED5	111	ORANGE	LED11	80	ORANGE
LED6	112	RED	LED12	81	RED

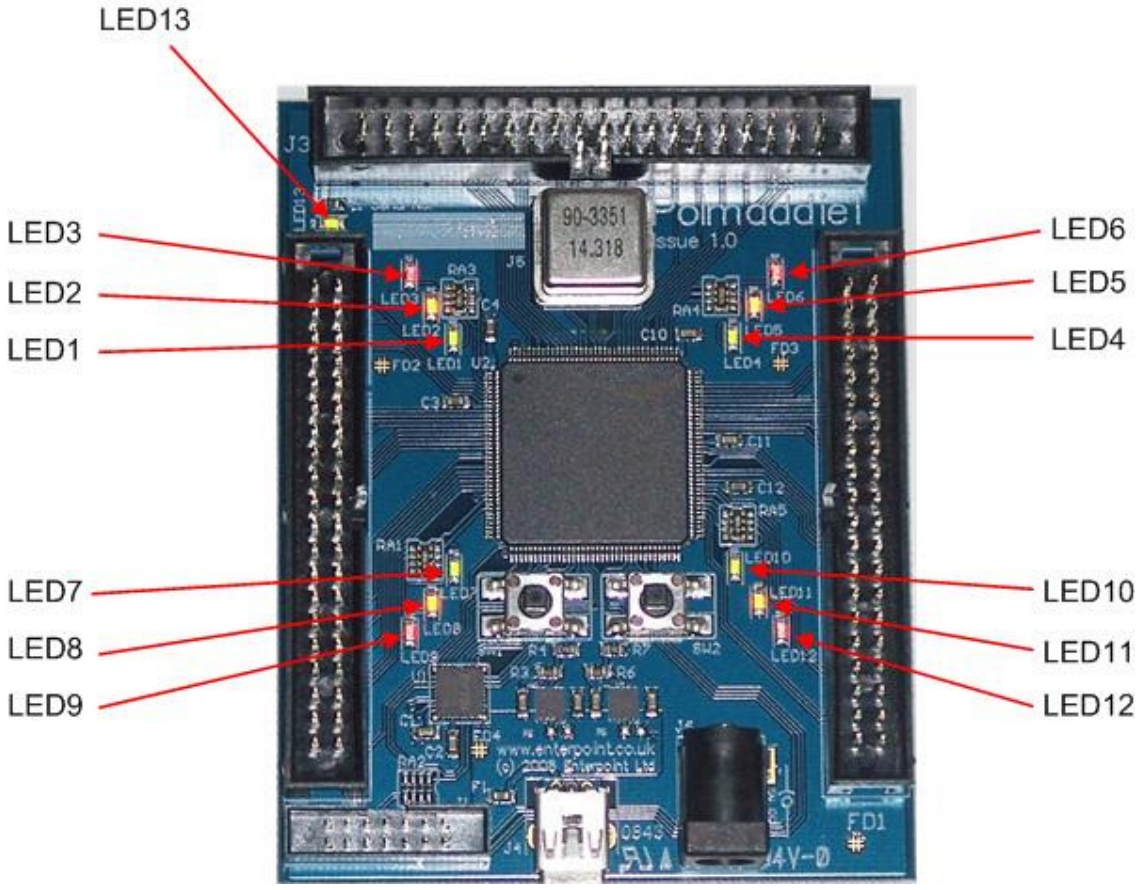

Figure 6 – Polmaddie1 LEDs

Switches

Polmaddie1 has two push button switches; to use these switches the IO pins connected to the switches must have a pull up resistor setting in the constraints file. This means that when a switch is activated a low level signal will be detected on the CPLD pin.

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The two switches are connected to the following IO pins:

SWITCH 1	SWITCH 2
51	61

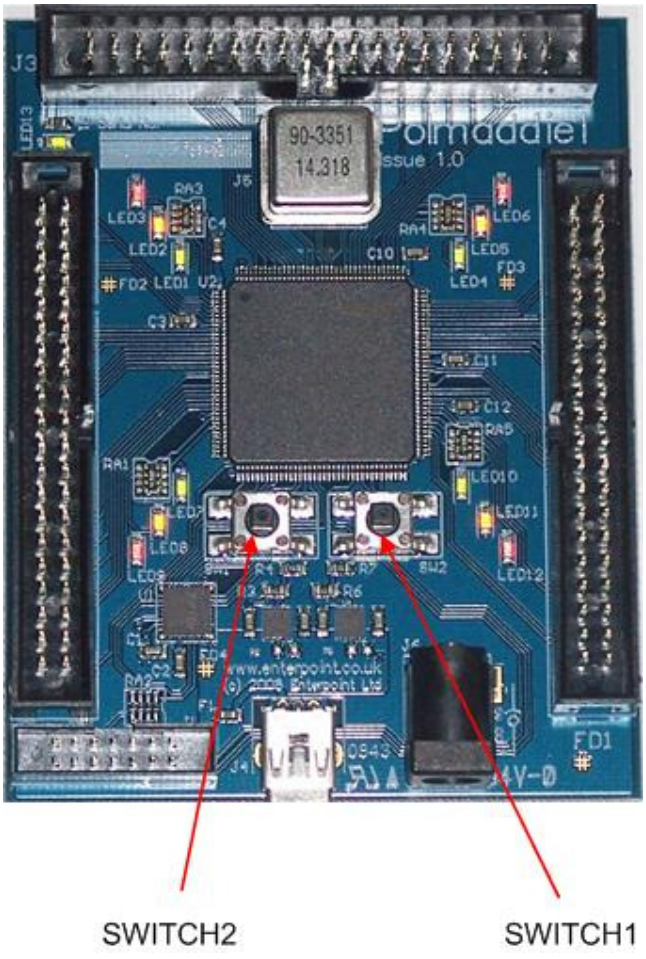

Figure 7 – Polmaddie1 Switches

USB Interface

The USB interface on the Polmaddie1 is achieved using an FT232R USB to serial UART interface. The datasheet and drivers for this device are available from http://www.ftdichip.com. When appropriate drivers are installed the Polmaddie1 USB port should be detected as a serial port. Alternative data optimised drivers are also available from FTDI.

The FT232R is connected to the CPLD and provided a simple UART, or other converter, is implemented then the data sent over the USB serial port can be used either as control and/or data information. This allows a host computer to act in a number of ways including system control and data storage functions.

The FT232R can also supply a clock to the CPLD using CBUS4 I/O. This I/O can be programmed by tools available from FTDI to output different frequencies or other functions. The FT232R can provide clock frequencies of 6/12/24/48MHz.

The connections between the USB device and the CPLD are shown below:

FT232R	CPLD PIN
CBUS4 (USB CLOCK)	38
CTS#	41
DCD#	43
DSR#	45
RI#	49
RTS#	52
DTR#	53
TXD	54
RXD	50

The FT232R connections CBUS0 to CBUS3 are routed via a resistor array site RA2 (resistor array not fitted) to the JTAG connector for future use in reconfiguring the CPLD via a USB interface, a scenario which is theoretically possible but not so far established. These connections, were the resistor array to be fitted, would be as shown below:

FT232R	JTAG SIGNAL
CBUS0	TMS
CBUS1	TCK
CBUS2	TDI
CBUS3	TDO

Programming Polmaddie1

The programming of the CPLD on Polmaddie1 can be achieved using the XILINX ISE tool iMPACT. It is anticipated that a JTAG connection will be used in conjunction with this software. There is a single JTAG chain on Polmaddie1 which allows the programming of the CPLD.

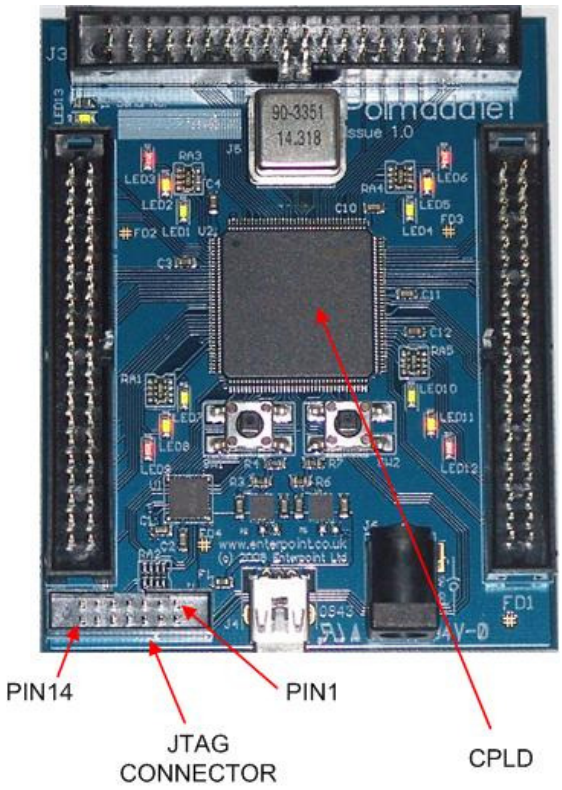

Figure 8– Polmaddie1 JTAG

The JTAG connector has a layout as follows:

GND	GND	GND	GND	GND	GND	GND (pin1)
NC (pin14)	NC	TDI	TDO	TCK	TMS	3.3V

Using the Xilinx iMPACT software the JTAG chain appears like this:

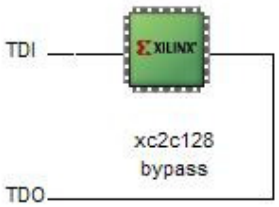

Figure 9– Polmaddie1 JTAG CHAIN

Generation of suitable .jed files and control of the JTAG chain can be achieved using the XILINX ISE tool IMPACT.

Mechanical Arrangement

Dimensions are in millimetres. The three 40-way connectors are arranged on a 0.1 inch grid relative to eachother.

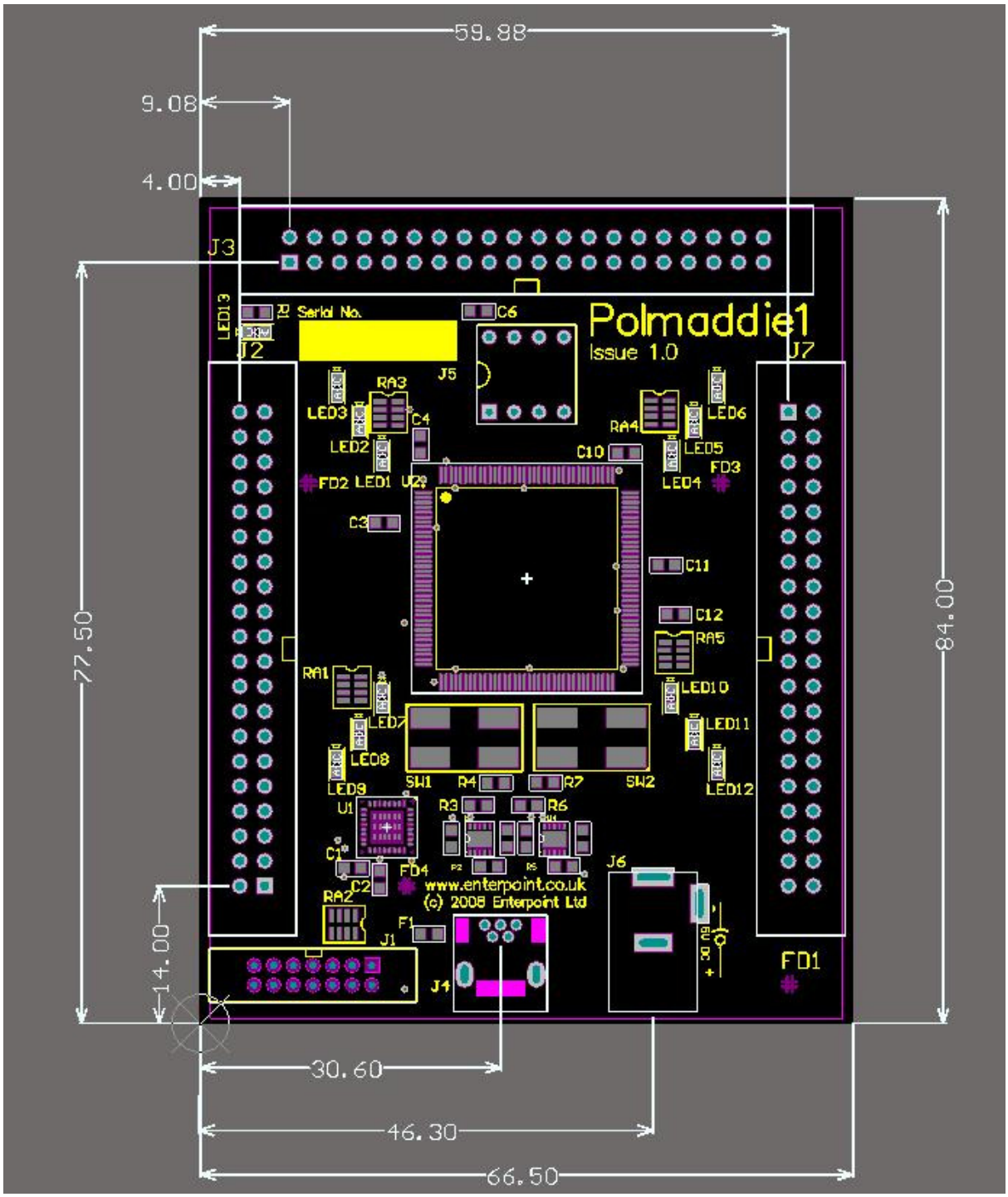

Figure 10– Polmaddie1 Mechanical Arrangement

Medical and Safety Critical Use

Polmaddie1 boards are not authorised for the use in, or use in the design of, medical or other safety critical systems without the express written person of the Board of Enterpoint. If such use is allowed the said use will be entirely the responsibility of the user. Enterpoint Ltd will accepts no liability for any failure or defect of the Polmaddie1 board, or its design, when it is used in any medical or safety critical application

Warranty

Polmaddie1 comes with a 90 return to base warranty. Enterpoint reserves the right not honour a warranty if the failure is due to maltreatment of the Polmaddie1 board.

Outside the warranty period Enterpoint offers a fixed price repair or replacement service. We reserve the right not to offer this service where a Polmaddie1 has been maltreated or otherwise deliberately damaged. Please contact support if need to use this service.

Other specialised warranty programs can be offered to users of multiple Enterpoint products. Please contact sales on boardsales@enterpoint.co.uk if you are interested in these types of warranty,

Support

Enterpoint offers support during normal United Kingdom working hours 9.00am to 5.00pm. Please examine our Polmaddie1 FAQ web page and the contents of this manual before raising a support query. We can be contacted as follows:

Telephone - +44 (0) 121 288 3945
Email - support@enterpoint.co.uk